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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,751	03/07/2001	Alexander Douglas Mossman	12689US02	4759

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EXAMINER

RUTHKOSKY, MARK

ART UNIT PAPER NUMBER

1745

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n N .

09/800,751

Applicant(s)

MOSSMAN, ALEXANDER
DOUGLAS

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 1-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 22-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 and 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Priority

The application is a CIP of application 09/521,228 filed 3/8/2000.

Information Disclosure Statement

The information disclosure statements filed 9/15/2002 and 5/31/2001 have been placed in the application file, and the information referred to therein has been considered as to the merits.

Drawings

The drawings filed on 3/7/2001 are objected to as shown in the attached PTO-948, Notice of Draftsperson's Drawing Review.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the electrode claims are directed. A suggestion is "Membrane Exchange Humidifier for a Fuel Cell."

Election/Restriction

Applicant's election with traverse of claims 22-38 in Paper No. 7 is acknowledged. The traversal is on the ground(s) that the claims are sufficiently related in technical subject matter. This is not found persuasive because the inventions are distinct and have a separate status in the

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art. The restricted groups are to a method of humidifying a fluid stream and a fuel cell system. A method of humidifying a fluid stream is not specific to a fuel cell. In claims 1-14, there is no relationship with a fuel cell. The intended-use language in claims 15-21 do not provide structure in the claim and thus, the claims do not show use together. The distinct inventions also have different modes of operation, different functions and different effects. Thus, the search required for such a method is not readily performed in the coextensive fuel cell art. The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 38 is rejected under 35 U.S.C. 102(e) as being anticipated by Voss et al. (US 6,106,964.)

The instant claims are to a solid polymer fuel cell system comprising a solid polymer fuel cell and an apparatus for humidifying a reactant gas supply stream, said fuel cell having a reactant gas inlet port and a reactant gas exhaust port, said humidifying apparatus comprising a membrane exchange humidifier comprising a supply stream chamber having an inlet and an outlet with the inlet having a reactant gas fluidly connected thereto and the outlet fluidly connected to the fuel cell reactant gas inlet port; an exhaust stream chamber having an inlet

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fluidly connected to the fuel cell reactant gas exhaust port; and a water permeable membrane separating the supply stream chamber and the exhaust stream chamber whereby water is transferred across the membrane from the reactant gas exhaust to the reactant gas supply stream.

Voss et al. (US 6,106,964) teaches an assembly where water vapor from a fuel cell exhaust is used to humidify a reactant gas supply stream that is on the opposite side of a water permeable membrane (see fig. 1, col. 9, and col. 13, lines 1-15.) The stream to be humidified may be an oxidant or fuel stream (see col. 4, lines 29-47.) The membrane is made of cellulose or perfluorosulfonic acid. The water is transferred across the membrane by a partial pressure difference (see col. 7, lines 32-45.) The humidifier configuration of the reference (figures 1-6, and col. 11-12) is the same as in the instant application/figures. Plates, frames, manifolds, seals, ridges and depressions are noted (in Figure 5 and column 11.) Alternative constructions are noted in col. 12, lines 20-65. Ports are located in the frames and the membranes (figure 5.) Thus, the claim is anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voss et al. (US 6,106,964) in view of Debe (US 5,910,378.)

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The instant claims are to a solid polymer fuel cell system comprising a solid polymer fuel cell and an apparatus for humidifying a reactant gas supply stream, said fuel cell having a reactant gas inlet port and a reactant gas exhaust port, said humidifying apparatus comprising a membrane exchange humidifier comprising a supply stream chamber having an inlet and an outlet with the inlet having a reactant gas fluidly connected thereto and the outlet fluidly connected to the fuel cell reactant gas inlet port; an exhaust stream chamber having an inlet fluidly connected to the fuel cell reactant gas exhaust port; and a water permeable membrane separating the supply stream chamber and the exhaust stream chamber whereby water is transferred across the membrane from the reactant gas exhaust to the reactant gas supply stream. The membrane comprises a microporous polymer and a hydrophilic additive. When dry the membrane is substantially permeable to at least one component of at least one of the reactant gas supply and exhaust streams.

Voss et al. (US 6,106,964) teaches an assembly where water vapor from a fuel cell exhaust is used to humidify a reactant gas supply stream that is on the opposite side of a water permeable membrane (see fig. 1, col. 9, and col. 13, lines 1-15.) The stream to be humidified may be an oxidant or fuel stream (see col. 4, lines 29-47.) The membrane is made of cellulose or perfluorosulfonic acid. These membranes are microporous membranes as well described in the art. The membrane is permeable to a reactant gas when dry, however, the addition of water, prohibits transfer of hydrogen gas. The water is transferred across the membrane by a partial pressure difference (see col. 7, lines 32-45.) The relationships between dew points and temperature are taught in cols. 14-16. The humidifier configuration of the reference (figures 1-6, col. 11-12) is the same as in the instant figures. Plates, frames, manifolds, seals, ridges and

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depressions are noted (in Figure 5 and column 11.) Bundle constructions are noted in col. 12, lines 20-65. The Voss reference does not teach the addition of a hydrophilic additive to the water permeable membrane. When using perfluorosulfonic acid, the sulfonic acid groups render the material hydrophilic. Thus, no hydrophilic additive is present.

Debe (US 5,910,378) teaches a porous polymer membrane film as a backing layer for a membrane electrode/electrolyte assembly. The backing layer membrane may be of high-density polyethylene with an additive (col. 8, lines 45-60.) The material transfers water vapor across the assembly in order to allow for continued humidification of the electrolyte assembly (col. 3, lines 28-44 and col. 6, lines 44-end.) The pore sizes of the membrane are between about 0.01 and 10 μm (col. 6, lines 44-col. 7, line 15.) Porosity may be greater than 50% (col. 16, lines 18-33.) Fillers, including silica, may be added (col. 7, lines 57-65.) The material may have a Gurley number in the range of 500-4000 s / 100 cm^3 air (for example, see Tables 7 and 8.) It would be obvious to one of ordinary skill in the art at the time the invention was made to substitute the membrane of Debe (US 5,910,378) as the humidifying membrane of Voss et al. (US 6,106,964) as the material is shown to provide a means for transferring water across the membrane in order to humidify the opposite side of the membrane. One of ordinary skill in the art would apply this membrane material as a humidifier membrane in Voss et al. (US 6,106,964) as it will allow for the transfer of water as taught by Debe (US 5,910,378.)

With regard to claim 24, the reference does not teach that the membrane is permeable to up to about 1% of a reactant gas volume during steady state fuel cell operation. It would be obvious to one of ordinary skill in the art at the time the invention was made to minimize the amount of gas passing through the membrane as one of ordinary skill would understand that little

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or no gas should pass through the membrane in order to provide water to the reactant gas and hydrate the fuel cell reactants (see col. 3, lines 1-20 and col. 5, lines 45- col. 6, line 45.)

Examiner Correspondence

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1193. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 703-305-0587. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:00.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 703-308-2383. The fax number for the organization is 703-872-9306.

Mark Ruthkosky

Primary Patent Examiner

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12/17/03